Ethiopian Health Professionals' Licensure Examination

Medical Laboratory Science Exam
Yekatit 2013/February 2021
PART ONE

BOOKLET CODE: 021
Number of Items: 100

SUBJECT CODE: 11
Time Allowed: 2:30 hours

DIRECTTIONS: Each of the following questions is followed by four possible alternative answers. Read each question carefully and **blacken** the letter of your best choice on the separate answer sheet provided.

1. A 57-year-old male patient living in high altitude area was requested for measurement of serum sodium and potassium levels. The laboratory technologist collected blood specimen and analyzed it using mass absorption spectrophotometric method.

   What could be the effect of altitude on the test result?
   (A) Decreased the concentration of Na^+ and K^+ by half
   (B) Increased the concentration of Na^+ and K^+ by half
   (C) The concentration of Na^+ and K^+ was doubled
   (D) No effect on the concentration of Na^+ and K^+

2. A laboratory technologist working in a given Hospital Clinical Chemistry Laboratory collected blood sample from a 55-year-old male patient in order to measure ALT and AST activities. The clinical diagnosis of the patient was indicated as alcoholic hepatitis.

   What will be the expected activity of ALT and AST for the diagnosis?
   (A) ALT increases more than two times than AST
   (B) AST increases more than two times than ALT
   (C) Both AST and ALT slightly increase than their normal range
   (D) Both AST and ALT increase two times than their normal range

3. A physician sent blood sample collected by EDTA tube from a 12-year-old female patient for serum potassium measurement. The laboratory technologist received and immediately rejected the sample because it was not collected in an appropriate tube. Then, the laboratory technologist informed the physician to collect the specimen in a tube with appropriate anticoagulant.

   What should be the appropriate anticoagulant for the tube?
   (A) Heparin
   (B) Sodium citrate
   (C) Sodium fluoride
   (D) Sodium oxalate

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4. A laboratory technologist working in a given Research Laboratory collected a blood specimen from 480 study participants for RFT measurement. The technologist wanted to prepare protein free filtrate for better RFT measurement.

What could be the appropriate reagent used to prepare protein free filtrate?
(A) Acetic acid
(B) Sodium hydroxide
(C) Potassium hydroxide
(D) Trichloroacetic acid

5. A laboratory technologist was analyzing different clinical chemistry tests at Regional Laboratory using an open system clinical chemistry analyzer. The available reagents were stock out and other reagents were purchased for the analysis. Then, the instrument should be calibrated using appropriate solution.

What would be the appropriate solution used to calibrate the instrument?
(A) Blank solutions
(B) Control solutions
(C) Standard solutions
(D) Known sample solutions

6. A laboratory technologist working in a Clinical Chemistry Laboratory received a blood sample for urea measurement using spectrophotometric method of a linear reaction system. The technologist runs a standard solution and then the serum sample. The absorbance of the standard solution was 0.45 and the unknown sample was 0.4. Finally, the calculated concentration result of unknown sample was 17.77 mg/dl.

What was the concentration of the standard solution?
(A) 10 mg/dL
(B) 15 mg/dL
(C) 20 mg/dL
(D) 25 mg/dL

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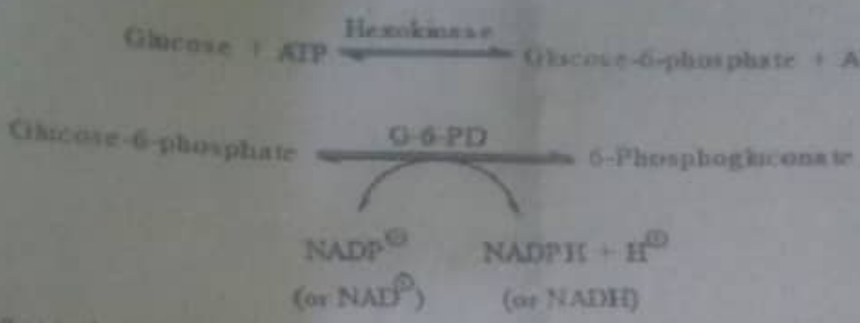
A laboratory technologist received whole blood specimen from a 57-year-old female diabetic patient for glucose measurement. The technologist processed the sample and performed the test using hexokinase method based on the following reaction principle. According to the principle, the amount of NADPH was measured at 340 nm.



What is the type of reaction?

(A) Depletion reaction
(B) Constant reaction
(C) Decreasing reaction
(D) Increasing reaction

8. A laboratory technologist collected blood specimen from a 73-year-old male patient to measure total cholesterol. Then, the technologist analyzed the total cholesterol using different enzymes in coupled enzymatic method.

What enzymes most likely involved in the coupled reaction?

(A) Cholesterol ester hydrolase, lipase and glycerol kinase
(B) Cholesterol ester hydrolase, cholesterol oxidase and peroxidase
(C) Cholesterol ester hydrolase, cholesterol oxidase and lactate dehydrogenase
(D) Cholesterol ester hydrolase, cholesterol oxidase and glycerolphosphate oxidase

9. A laboratory technologist collected blood specimen from a 31-year-old woman for lipid profile tests. The technologist analyzed and recorded the result on the request form. However, the value of LDL-cholesterol was highly elevated while other lipid parameters were normal. The physician was doubtful with LDL cholesterol result and asked the technologist to review the result. The result was normal when the technologist reviewed the result of the patient.

What was the most likely cause of this error?

(A) Labeling error
(B) Pipeting error
(C) Analytical error
(D) Transcription error

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10. A 67-year-old male patient with glomerulonephritis came to the laboratory for creatinine clearance test. Blood and urine specimens were collected and analyzed based on SOPs. The laboratory results showed a urine creatinine of 80 mg/dl, serum creatinine 2 mg/dl, 24 hour urine 1000 ml, height 1.72 meter and weight 58 kg. The average body surface area was given as 1.73 m^2 and the body surface area of the patient was calculated as 1.66 m^2.

How much is the creatinine clearance of the patient?

(A) 27.7 mL/min
(B) 28.9 mL/min
(C) 47.9 mL/min
(D) 49.9 mL/min

11. A 43-year-old female patient brought a request paper for renal function test to the Laboratory. Then, the laboratory technologist collected, processed and analyzed blood specimen. He reported the results as increased urea level and normal creatinine level. The calculated BUN to creatinine ratio was increased and greater than 30:1.

What was the most likely cause of this increased ratio?

(A) Severe liver disease
(B) Acute tubular necrosis
(C) Post-renal obstruction
(D) Gastrointestinal hemorrhage

12. A 37-year-old male patient with bradycardia, decreased pulse pressure, cool and/or dry skin, puffy eyes, and loss of the outer lateral eyebrows visited a laboratory for thyroid function tests. Then, the laboratory technologist collected and processed the sample according to the established SOPs. The sample was analyzed using chemiluminescence principle and the following laboratory results were reported: high TSH, low free T4, and low T3.

What disease condition most likely caused the above alterations?

(A) Central hypothyroidism
(B) Tertiary hypothyroidism
(C) Primary hypothyroidism
(D) Secondary hypothyroidism

13. A 43-year-old man with jaundice was suspected for certain tumor and came to the laborator for routine laboratory tests. His laboratory results showed normal CBC, elevated ALI slightly elevated GGT, normal ACP, normal ALT and normal AST, high serum tot bilirubin and positive for urine bilirubin.

What disease condition most likely causes the above alterations?

(A) Prostate cancer
(B) Colorectal cancer
(C) Bile duct cancer
(D) Pancreatic cancer

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14. A recently employed laboratory technologist performed a total protein test using manual spectrophotometer instrument in a given clinical chemistry laboratory. Unfortunately, a measurement unit was not written in the test method's leaflet as well as in SOPs. The technologist should report the test result using the commonly used measurement unit.

What measurement unit is most preferable to report the result?

(A) meq/dl (B) µg/dl (C) mg/dl (D) gm/dl

15. A 35-year-old male patient with complaints of weakness and poor energy visited a clinician. The clinician suspected the patient for malabsorption. Thus, the clinician requested serum protein profile test. Accordingly, the technologist processed the sample and measured serum protein profile level.

Which serum protein profile level results confirm the clinician's diagnosis?

(A) Albumin high, and globulin normal
(B) Albumin low, and globulin normal
(C) Albumin normal, and globulin high
(D) Albumin normal, and globulin low

16. A laboratory technologist working in a given Hospital Clinical Chemistry Laboratory has purchased a new semi-automated clinical chemistry instrument. Then, he calibrated the machine to perform aspartate transaminase (AST) test based on the following principle:

$$\text{Aspartate} + \alpha\text{-Ketoglutarate} \xrightleftharpoons[\text{P-5-P}']{\text{AST}} \text{Oxoglutarate} + \text{glutamate}$$

$$\text{Oxoglutarate} + \text{NADH+H} \xrightleftharpoons{\text{MAD}} \text{Malte} + \text{NAD}^+$$

The activity of AST enzyme was determined spectrophotometrically on the basis of change in absorbance due to consumption of NADH to NAD^+ which was read at 340 nm.

What is the type of the above reaction?

(A) A constant reaction
(B) A decreasing reaction
(C) An increasing reaction
(D) End point reaction

17. A 40-year-old male patient with complaints of distended abdomen and fat indigestion visited a clinician. The laboratory diagnosis results were as follows: the patient's serum was icterus, the stool color was clay, he was positive for gallbladder stone (by ultrasound), serum direct bilirubin level was 1.5 mg/dl (Reference range 0-0.5 mg/dl), and serum total bilirubin level was 2.5 mg/dl (reference range of 1.0-1.5 mg/dl).

What kind of jaundice did the results indicate?

(A) Pre-hepatic jaundice
(B) Hepatic jaundice
(C) Post-hepatic jaundice
(D) Difficult to decide

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18. A 55-year-old female patient was admitted to the emergency department of a given cardiac hospital. The clinician diagnosed the patient for an acute myocardial infarction (MI). Then, the clinician requested cardiac function tests for the patient. Unfortunately, the laboratory had cTnT (cardiac troponin T), LD, CK, CK-MB and AST test reagents only for the cardiac tests panel.

What combination of tests better diagnose the sudden onset of the myocardial infarction?
(A) AST and CK
(B) cTnT and AST
(C) cTnT and CK-MB
(D) LD and CK-MB

19. A laboratory technologist working in a given hospital performed electrolyte tests using Ion selective electrode (ISE) method. However, the ISE method usually suffers from interferences and sometimes the technologist measures electrolytes repeatedly.

What interference commonly coats the ISE membrane?
(A) Carbohydrate compounds
(B) Free radical compounds
(C) Protein compounds
(D) Vitamin compounds

20. A 45-year-old male patient brought a request paper for the measurement of serum calcium ion level. The phlebotomist tied the tourniquet on the arm of the patient for about 5 minutes to collect the blood sample.

How could the tourniquet affect serum calcium ion level?
(A) Increases both total and free calcium ions level
(B) Increases only total calcium ion level
(C) Increases only free calcium ion level
(D) No effect on calcium measurement

21. A laboratory technologist working in a given hospital was unable to reason out why different body enzymes measurement is made indirectly by assessing enzyme activities rather than direct measurement of enzyme concentrations.

What is the reason to measure enzyme activity rather than enzyme concentration directly?
(A) Enzymes found in fixed temperature in body fluids and difficult to measure outside
(B) Enzymes found in very high quantities in body fluids and difficult to measure
(C) Enzymes found in very small quantities in body fluids and difficult to measure
(D) Enzymes found together with cofactors in body fluids and difficult to measure

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22. A 40-year-old male patient brought a request for the determination of serum testosterone hormone level. The laboratory technologist collected blood sample and started processing the measurement of testosterone hormone level by ELISA method.

Which statement best describes the test principle of the method?

(A) Degree of product formation between serum analyte and respective reagent
(B) Degree of interaction of serum Ag or Ab with reagent Ab or Ag, respectively
(C) Degree of emitted radiant energy when serum anayte returns inert after excitation
(D) Degree of refraction formed after a radiant energy passes through a turbid solution

23. A laboratory technologist received an overnight preserved urine specimen of a 13-year-old male patient admitted at an in-patient department. The technologist was requested to determine all routinely measured urine parameters.

What urine parameters result would be highly affected?

(A) Physical parameters
(B) Chemical parameters
(C) Biochemical parameters
(D) Microscopic parameters

24. A laboratory technologist working in a diagnostic laboratory received a request paper for urine culture test. Then, the technologist assembled the necessary materials needed to collect the urine specimen.

What criteria should be fulfilled by the urine container before the sample collection?

(A) Size, dryness, cleanness, leak proof
(B) Shape, dryness, cleanness, leak proof
(C) Sterility, dryness, cleanness, leak proof
(D) Dryness, cleanness, leak proof, plastic container

25. A laboratory technologist received urine specimen of a 40-year-old female patient for routine urinalysis tests. Nevertheless, he was busy by doing previously requested tests and he could not be able to process the sample in the recommended period.

What is the best possible preservative to be used for the specimen?

(A) Freezing it at -10^0C
(B) Freezing it at -20^0C
(C) Refrigerating it at $2\text{-}8^0C$
(D) Refrigerating it at 30^0C

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31. A laboratory technologist working at a health center received urine specimen of a 2-year-old female patient with history of acute vomiting and diarrhea for microscopic examination. The volume of urine he received was under the standard and he centrifuged only 6ml of urine to get sediment. The microscopic examination of urine sediment resulted 8WBCs/HPF (an average number of WBCs).

How many WBCs were reported?

(A) 8 WBCs/HPF
(B) 10 WBCs/HPF
(C) 11 WBCs/HPF
(D) 16 WBCs/HPF

32. A laboratory technologist working at a health center laboratory received urine specimen of a 34-year-old women patient for routine urinalysis test. The technologist examined her urine physically and chemically and found that it was significantly turbid and acidic.

What microscopic parameter could highly correlate with the above findings?

(A) Triple phosphate
(B) Calcium carbonate
(C) Calcium oxalate
(D) Amorphous phosphate

33. A laboratory technologist working at urinalysis laboratory received urine specimen of a 34-year-old female patient for routine urinalysis test. Then, the technologist checked whether the specimen was properly labeled with the patient's identification number, date and time of collection, additional information such as patient's age, location, and physician's name immediately.

What should the technologist do next before the actual examination process?

(A) Physical assessment
(B) Chemical analysis
(C) Microscopic analysis
(D) Check the request paper

34. A laboratory technologist working at Clinical chemistry laboratory prepared working solution to determine the concentration of different body analytes of blood specimen collected from a 13-year-old female patient.

What type of water the technologist should use to prepare the working solution?

(A) Tap water
(B) Boiled water
(C) Distilled water
(D) Deionizer water

35. A laboratory technologist working at a clinical chemistry unit of a referral hospital received a serum specimen of a 45-year-old female patient suspected of having liver function problems. In order to start the testing process, the technologist has to prepare working reagents first.

What type of pipette has to be used for correct testing process?

(A) Serological pipette
(B) To deliver pipette
(C) To contain pipette
(D) Blown out pipette

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36. A laboratory technologist working in a health center received a request paper from a 38-year-old male patient for liver function test measurements. There was only manual colorimeter clinical chemistry analyzer in the laboratory.

Which part of the instrument enabled an absorbance reading at range of wavelengths?
(A) Filter
(B) Cuvet
(C) Detector
(D) Monochromator

37. A laboratory technology student came to a diagnostic clinical chemistry laboratory for practical attachment. The student asked the senior laboratory technologist how the bands formed one electrophoresis medium.

What was the most possible explanation of the technologist?
(A) The band is formed based upon size to volume ratio
(B) The band is formed based upon volume to mass ratio
(C) The band is formed based upon charge to mass ratio
(D) The band is formed based upon volume to charge ratio

38. A laboratory technologist working at a research laboratory wants to separate a protein mixture using ion exchange chromatographic technique. Therefore, he wants to adjust the iso-electric point of the protein of interest so that it will be eluted out fast and with expected amount.

What solution should be used to partition the proteins according to their iso-electric point?
(A) Buffer solution
(B) Sample solution
(C) Acidic solution
(D) Alkaline solution

39. A laboratory technologist performs Ziehl-Neelsen staining for the diagnosis of *Mycobacterium leprae*. The technologist performs all the stains correctly except adding the counter stain.

What will the technologist likely observe during the examination of this staining?
(A) Red rod shaped bacteria with green background
(B) Green rod shaped bacteria with red background
(C) Red rod shaped bacteria with colorless background
(D) Green rod shaped bacteria with colorless background

40. A laboratory technologist performs gram staining from a wound swab. The technologist stains the fixed microscopic slide correctly until addition of lugol's iodine.

What is the next staining reagent to be used after washing it out?
(A) Acetone-alcohol
(B) Carbolfuchsin
(C) Crystal violet
(D) Safranin

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41. A laboratory technologist collects a wound sample for bacterial culture at a health center. Because there is no culturing facility in the health center, the technologist plans to collect the specimen and transport to the nearby hospital laboratory.

What is the most likely culture media to be used?
(A) Solid media
(B) Semi-solid media
(C) Liquid media
(D) Agar media

42. A laboratory technologist is preparing a medium that is enriched by serum. But, the serum is suspected to be contaminated by microorganisms and needs to be sterilized.

What is the appropriate method of sterilization the lab technologist must apply?
(A) Autoclaving
(B) Boiling
(C) Filtration
(D) Red heat

43. A laboratory technologist inoculates gram negative bacteria to triple sugar iron agar. After overnight incubation, the slant is pink in color whereas the butt has yellow and black colors.

What is the most appropriate interpretation of the test result?
(A) Glucose and lactose fermenter, and H_2S non-producer
(B) Glucose and lactose fermenter, and H_2S producer
(C) Glucose and lactose non- fermenter, and H_2S non-producer
(D) Glucose fermenter, lactose non- fermenter and H_2S producer

44. A term, male, 3300 grams weighing infant was delivered spontaneously. Physical examinations of the infant were normal during the first week of life; however, the child started feeding irregularly during the second week. On day 13, the baby was admitted to the hospital with generalized seizures. A small amount of cloudy cerebrospinal fluid was collected by lumbar puncture, and a group B *Streptococcus* was isolated from culture.

What was the most likely disease the infant developed?
(A) Rheumatic fever
(B) Subacute endocarditis
(C) Acute glomerulonephritis
(D) Late onset neonatal sepsis

45. A patient having a history of pyoderma develops a symptom characterized by acute inflammation of the renal glomeruli with edema, hypertension, hematuria, and proteinuria. Clinically acute glomerulonephritis was diagnosed and ASO test requested.

What is the most appropriate sample for the diagnosis of this disease?
(A) Biopsy (B) Blood (C) Stool (D) Urine

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0. A two-year-old daughter came to a hospital with clinical signs and symptoms of fever and difficulty of breathing after two days history of mild upper respiratory disease. On physical diagnosis, the physician suspected Epiglottitis. To confirm clinical suspicion, a laboratory technologist took a throat swab and inoculated on the appropriate culture media which revealed non-hemolytic with both X factor and V factor positive, catalase negative and gram negative coccobacilli.

What is the most likely etiologic agent for the patient condition?

(A) *C.diphteriae*
(B) *H.influenzae*
(C) *N.gonorrheae*
(D) *S.pyogen*

A four-year-old girl was brought to a hospital with complaints of serous rhinorrhea, sneezing, anorexia, and low-grade fever; progressing to repetitive coughs which end up with vomiting and exhaustion. There was a marked lymphocytosis in complete blood count. Throat swab was taken and inoculated in a culture media enriched with charcoal, starch, blood, and albumin so that the result revealed extremely small gram-negative coccobacilli.

What is the most likely clinical condition of the patient?

(A) Pneumonia
(B) Bronchitis
(C) Pertussis
(D) Rhinitis

2. A medical laboratory technologist who had a history of processing a biological sample having brucellosis complains for malaise, fever, weakness, aches, and sweats. He reported that the fever usually rises in the afternoon and falls during the night and accompanied by drenching sweat. After physical diagnosis, culture was requested.

What is the most recommended sample to be collected in this case?

(A) Morning urine and deprotienized serum
(B) Aspirated Bone marrow and blood
(C) Gastrointestinal and nasal washing
(D) Throat and mouth washing

3. A 28-year-old male patient came to adult OPD with an illness characterized by abdominal pain, bloody diarrhea, vomiting, and fever. In a microbiological analysis, non lactose fermenter and non H_2S producer gram negative rod isolate was identified.

What is the most likely disease caused by the bacteria?

(A) Salmonellosis
(B) Hemorrhagic fevers
(C) Bacillary dysentery
(D) Pseudomembranous colitis

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54. A *Vibrio cholera* outbreak was suspected in a number of communities that have shortage of clean drinking water and latrine. A laboratory technologist was asked to collect and transport stool specimen from a diseased person in the community to carry out microbiological analysis in the nearby regional laboratory.

What is the appropriate culture media used for this purpose?
(A) Nutrient broth
(B) Alkaline peptone water
(C) Amies transport medium
(D) Cary-Blair transport medium

55. A 25-year-old male patient visited a hospital for his clinical feature of diffuse infiltration of the skin by multiple nodules of varying size. The patient mentioned as he has family history of leprosy. The laboratory diagnosis of the specimen taken from skin nodule showed numerous acid fast rods.

What is the possible route of transmission of this pathogen?
(A) Hereditary
(B) Contact with lesion
(C) Contaminated water
(D) Vector borne

56. A 41-year-old male patient visited a hospital for symptoms of erythematous macules, papules, nodules on nasal cartilage and ear lobe with numbness on extremities as indicated by physical examination. The physician suspected leprosy and requested for microscopic test.

What is the appropriate way of specimen collection for the case?
(A) Skin smear
(B) Spot sputum
(C) Lymph node aspiration
(D) Bone marrow

57. A group of researchers were working on the causative agent of the conjunctivitis in high prevalent areas. The researchers found a small, non-motile and gram-negative intracellular bacterial parasite with a tropism for columnar epithelial cells lining the mucous membranes.

What is the most likely causative agent of the disease?
(A) *Chlamydia trachomatis*
(B) *Rickettsia prowazekii*
(C) *Haemophilus influenza*
(D) *Neisseria gonorrhoeae*

58. A female prisoner developed an acute febrile illness after three weeks of her imprisonment. She visited the prison clinic for help. A physician suspected for epidemic typhus and requested for serological Weil-Felix test and the laboratory technologist conducted the test for confirmation.

What type of antigen could be most likely used as a reagent for the test?
(A) Proteus somatic antigen
(B) Rickettsia somatic antigen
(C) Salmonella somatic antigen
(D) Chlamydia somatic antigen

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59. A 28-year-old woman with shaking chills and perspiration visited an emergency department of a hospital. Her temperature was 38° C and the microscopic examination of the blood film showed the presence of spiral bacteria. She lives in a rural area and had evidence of multiple insect bites, with recent tick bites.

What is the most likely diagnosis for the woman?

(A) Lyme disease
(B) Epidemic relapsing fever
(C) Relapsing fever
(D) Typhus

60. A patient with a symptom of primary syphilis comes to hospital. The serological test for *Treponemapallidum* showed positive result and the physician requested for the microscopic examination to confirm the result. A laboratory technologist prepared dark field microscope to examine the specimen taken from chancre on genitalia.

What is the feature of the pathogen under the microscope?

(A) Branching rods
(B) Spiral filament
(C) Bacilli in chains
(D) Cocci in groups

61. A physician requested a hematocrit measurement for a 30-year-old patient with chief complaint of fatigue. A medical laboratory technologist received the request, performed skin puncture and collected the blood directly with a capillary tube for hematocrit measurement using microhematocrit method. Finally, the measured hematocrit result for the patient was found to be low and the technologist planned to repeat the test.

What should the technologist have done to minimize the possible source of error?

(A) Never massage the site until it gets warm
(B) Remove the first two drops of blood
(C) Warm by immersion in a warm water
(D) Rub the site vigorously with thumb

62. A laboratory technologist wants to perform complete blood count by hematology analyzer. As a result, the technologist collects venous blood, mixed it properly and labelled with patient's information. However, due to extra duties in the lab, the technologist does not analyze it immediately.

What is the most likely action to be done on the processed blood sample?

(A) Put the sample in freezer until analyzed
(B) Discard and request another specimen
(C) Store the sample in refrigerator for two hours
(D) Leave the sample at room temperature until analyzed

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63. A 27-year-old febrile patient came to a laboratory for blood film examination. A laboratory technologist performed skin puncture and collected blood on microscopic slides. Then, the technician prepared thin smear using two clean microscopic glass slides.

What method was used to make the thin blood smear?

(A) Wedge method
(B) Cover glass method
(C) Cytospine method
(D) Automated method

64. A physician requested a peripheral blood film examination for cell morphology and hemoparasites. The laboratory technologist collected capillary blood from the patient and prepared both thick and thin blood film on a single slide. After the blood film has been dried well, he fixed the thin smear with absolute methanol and then wanted to prepare 50 ml of 10% Giemsa working solution from stock solution to stain the blood smear.

What volume of Giemsa and buffered water should he used, respectively?

(A) 5 ml of Giemsa and 45 ml of buffered water
(B) 10 ml of Giemsa and 90 ml of buffered water
(C) 5 ml of Giemsa and 95 ml of buffered water
(D) 45 ml of Giemsa and 5 ml of buffered water

65. A laboratory technologist wants to perform manual white blood cell counting using an Improved Neubauer Counting Chamber and collects blood from a patient and dilute it with Turk's solution containing 2% acetic acid. Then, the technologist transfers the diluted blood in to the counting chamber for counting.

What does the 2% acetic acid do in this procedure?

(A) It lyses non nucleated red blood cells
(B) It stains the nucleus of white blood cells
(C) It maintains the disc shape of red blood cells
(D) It maintains the morphology of white blood cells

66. A 30-year-old pregnant woman came to the hospital laboratory with a request of platelet count. The laboratory technician collects venous blood and makes a 1:100 dilution by placing 20 µl of well-mixed blood into 1980 µl of 1% ammonium oxalate in a small test tube. A total of 200 platelets were counted in the 25 small squares of the center square in the Improved Neubauer Counting Chamber.

What is the patient's total platelet count per unit volume of blood?

(A) 100,000 cells/ mm^3
(B) 200, 000 cells/ mm^3
(C) 400,000 cells/ mm^3
(D) 600, 000 cells/ mm^3

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67. A laboratory technologist working in the hospital laboratory wanted to determine haemoglobin level for a 25-year-old patient using a cyanmethemoglobin method. Finally, the haemoglobin level of the patient was 20g/dl in duplicate measurements.

What is the most likely cause for the abnormal haemoglobin value?
(A) Anemia
(B) Leukemia
(C) Polycythemia
(D) Thrombocytopenia

68. The laboratory technician working in the hospital wants to calculate the MCH of a patient. He measures the hemoglobin value and performs red cell count. The results are as follows: Hgb: 16g/dl and the RBC count 5 $x10^{12}$/L.

What is the approximate value of MCH for the patient?
(A) 23pg (B) 30pg (C) 32pg (D) 34pg

69. A haematologist, who is working in a hospital laboratory, has collected venous blood from a 26-year-old patient and runs for complete blood counts using a five part differential haematology analyzer. The haematologist reviewed the CBC result and obtained a RDW of 20%. Then he wanted to check the morphology of red blood cells from a Wright stained blood smear under 100 x objective light microscope.

What abnormal red cell morphology is most likely observed under light microscope?
(A) Poikilocytosis
(B) Microcytosis
(C) Macrocytosis
(D) Anisocytosis

70. A fourth year medical laboratory student wanted to measure the hemoglobin level of under five children in the community for research purpose using a hemoCue method. The student made skin puncture and a small drop of capillary blood was attracted by capillary action into a specially designed single used microcuvette which contains dry reagents (*sodium azide, and sodium nitrite*).

What is the most likely role of sodium nitrite and sodium azide in this procedure?
(A) To convert hemoglobin to methemoglobin
(B) To decrease the turbidity in the solution
(C) To disintegrate the red cell membrane
(D) To disintegrate the white blood cells

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71. A 37-year-old man working in a lead factory visited a hospital for treatment of unusual blackening of his gum. The physician sent a request of peripheral morphology examination to the laboratory. The laboratory technologist prepared and stained the smear with Wright stain. During microscopic examination, the technologist found small irregularly shaped and blue stained granules which are distributed throughout the red cell surface.

What is the most probable RBC inclusion that the technologist observed?

(A) Pappenheimer bodies
(B) Basophilic stippling
(C) Howell jolly bodies
(D) Cabot's ring

72. A 35-year-old pregnant woman with a chief complaint of fatigue, dyspnea, headache and heart palpitations came to a referral hospital. The physical examination result indicated that she has low blood pressure and pale skin and sclera. She has no ANC follow up till now and she has never taken any supplement after her pregnancy. The CBC result showed low RBC count, Hgb concentration, HCT value, MCV and MCHC.

What laboratory test should be further performed to diagnose the specific type of anaemia?

(A) Schilling test
(B) Folate test
(C) DAT test
(D) Iron test

73. A 28-year-old pregnant woman with blood type A Rh negative, who is married to a blood type B Rh positive man, came to a hospital for treatment of abdominal discomfort. This is her second pregnancy and she had no any follow up history during her first pregnancy. Hence, the physician performed physical examination and found that the fetus had reduced movement.

What type of anaemia is the patient most likely suffering from?

(A) Aplastic anaemia
(B) Haemolyticanaemia
(C) Iron deficiency anaemia
(D) Megaloblasticanaemia

74. A five-year-old child with epistaxis and haemoptysis was brought to a hospital. The haematologist was suspected of acute lymphoblasic leukemia (ALL) and wanted to differentiate ALL form AML.

What cytochemical staining is appropriate to demonstrate L1 and L2 subtypes of ALL cells?

(A) Sudan Black B
(B) Myeloperoxidase
(C) Acid phosphatise
(D) Neutrophil alkaline phosphatase

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75. A 75-year-old man, who is living in a lowland area, came to a referral hospital for treatment of headache, dizziness and paresthesias. The physical examination result showed splenomegaly and moderate hypertension. As a result, the physician ordered CBC to the laboratory and the results indicated cell count of WBCs: $14x10^9$cells/L (4-11x10^9), RBCs: $8x10^{12}$ cells/L (4.2-6.0 x10^{12}) and platelets: $480x10^9$cells/L (150-400x10^9), and 20g/dl Hgb, and 60% HCT levels, respectively.

What is the most likely diagnosed disease in the above case?

(A) Essential thrombocytemia
(B) Primary myelofibrosis
(C) Polycythemia vera
(D) Acute leukemia

76. A 25-year-old patient came to the laboratory with a request of coagulation profile test. The laboratory technologist arranged necessary materials for blood collection and planned to collect the blood with 0.5ml of sodium citrate containing test tube.

What volume of blood should be proportionally collected?

(A) 4.5ml (B) 5ml (C) 9ml (D) 18ml

77. A citrated whole blood was sent from the emergency OPD to the laboratory for PT, APTT and TT tests. The laboratory technologist performed the tests and the results showed increased PT, but normal APTT and TT.

What is the most probable cause of the above test results?

(A) Factor VIII deficiency
(B) Factor VII deficiency
(C) Factor X deficiency
(D) Factor V deficiency

78. A 36-year-old patient appointed for surgery requested PT and APTT tests to the laboratory. The laboratory technologist collected blood with right anticoagulant and ran the tests according to the SOPs. The PT and APTT results were 45 seconds and 35seconds, respectively when the technologist used 'Human reagent' and analyzed the test. However, when the test ran with another reagent, the result of PT and APTT were 20 seconds and 35 seconds, respectively.

What test should be performed to minimize the variation of PT between reagents?

(A) APTT (B) PT (C) TT (D) INR

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79. A six-year-old child with fatigue, bleeding and wasting came to a specialized hospital. The physician performed physical examination and planned to collect bone marrow biopsy sample to rule out leukaemia.

What is the appropriate site of bone marrow sample collection from the patient?
(A) Vertebral column
(B) Iliac crest
(C) Sternum
(D) Tibia

80. A phlebotomist needed to collect blood from an adult patient using ordinary needle and syringe method. After assembling all the required materials and identified the patient, the phlebotomist started drawing blood from the vein in the forearm. While he drew blood, he observed a small red spots indicating that small amounts of blood have escaped into the skin. What type of complication does he noticed?
(A) Hemoconcentration
(B) Ecchymosis
(C) Hematoma
(D) Petechiae

81. A physician sent a laboratory request for a 15-year-old male patient to rule out acute febrile illness. A laboratory technologist received the request paper and checked the requested tests. After that the technologist collected capillary blood via skin puncture for haematological investigation.

What is the most appropriate haematological test to be performed using the sample?
(A) Complete blood cell count
(B) Coagulation profile assay
(C) Blood film preparation
(D) ESR determination

82. A laboratory technologist received a request of blood cell morphology study. After collecting capillary blood, the technologist prepared thin blood film using a two slide method and stained with Wright stain. As soon as the blood film was dried, the technologist examined the blood film under light microscope using 100X objective.

What part of the blood film is most likely evaluated for morphology study?
(A) The tail of the blood film
(B) The head of the blood film
(C) The body of the blood film
(D) The area just behind the tail

83. Parents with their four children came to the laboratory to know their children's blood types. The laboratory technologist took blood from children and performed tests according to SOPs. The laboratory result indicated that the blood groups of them were A, B, AB and O.

What is the most likely blood type of the parents?
(A) A and O
(B) A and B
(C) AB and O
(D) AB and AB

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84. A 25-year-old pregnant woman in her first trimester comes to the antenatal care unit in order to start her regular ANC follow up. The physician sends a laboratory request for Rh blood typing. The assigned laboratory technician starts doing the requested investigation after he takes blood sample from the pregnant woman.

What is the appropriate method of Rh blood typing the laboratory technician has to use?

(A) Reverse typing
(B) Forward typing
(C) Serum typing
(D) Indirect typing

85. A 31-year-old pregnant woman, in her first pregnancy, visits the ANC unit to start a regular follow up. The physician sends her to the laboratory with a request of Rh-type determination. The laboratory technologist performs the required procedures and finds the woman is Rh-positive. However, the technologist noticed that the woman's previously recorded Rh blood type is negative. The laboratory technologist repeats the procedure by washing the cells many times with warm saline and then the woman's repeated Rh-blood typing result is negative.

What is the most likely cause of the false positive result?

(A) Warm-agglutinins
(B) Cold- agglutinins
(C) Reagent deterioration
(D) Polyagglutinable cells

86. A laboratory technologist planned to collect blood from a 30-year-old male blood donor. The technologist assembled all the necessary materials prior to collection. Then, the technologist started drawing the blood and in the middle of transfusion the donor shows signs of sweating, dizziness, pallor, and convulsions.

What is the first most appropriate measure the laboratory technologist has to do?

(A) Loosen the tourniquet and continue drawing
(B) Remove the tourniquet and withdraw needle
(C) Place cold compresses on the donor's forehead
(D) Raise the donor's legs above the level of the head

87. A physician requests cross-match test for a 31-year-old severely anemic patient prior to blood transfusion. The laboratory technologist receives the request and assembled all the necessary materials and reagents to detect the presence of antibodies in the recipient's serum that can destroy the donor's red cells.

What is the most appropriate type of cross-match to be used?

(A) Minor cross-match
(B) Major cross-match
(C) Computer cross-match
(D) Anti-globulin cross-match

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88. A 35-year-old pregnant mother, on her first ANC visit to the hospital, came to the laboratory with a request of ABO and Rh typing. The laboratory technologist performs the appropriate steps and the result reveals group O Rh-negative. However, the technologist wants to check the presence of weak D antigen in the pregnant mother's RBC.

What is the appropriate method he has to use for this step?

(A) Saline test method
(B) Albumin test method
(C) Direct anti-globulin test
(D) Indirect anti-globulin test

89. A bony tissue was sent to the laboratory from the pathology ward for tissue processing. The laboratory technologist received the specimen and arranged the necessary materials for the procedure.

What is the most appropriate first step the lab technologist should do?

(A) Fix the tissue
(B) Clear the tissue
(C) Dehydrate the tissue
(D) Decalcified the tissue

90. A pathologist sent a surgical biopsy to the laboratory for tissue processing. Up on receiving the request paper with the specimen, the laboratory technologist observed that the pathologist wrote tissue processing for electron microscope.

What is the appropriate type of microtome the technologist should use?

(A) Rotary rocking microtome
(B) Base sledge microtome
(C) Sliding microtome
(D) Ultra microtome

91. A patient with an acute febrile illness was examined by a clinician and was sent to a serology unit for lab examination of weil-felix test. The lab technologist collected blood sample from the patient and performed the test as per the principle. The result was reactive.

What is the most appropriate principle of the test behind this reaction?

(A) Cross-linking of Rickettsia antigens in the sample with anti-Rickettsia antibodies
(B) Cross-reactivity of Rickettsia antigens in the sample with anti-Proteus antigens
(C) Cross-reactivity of anti-Rickettsia antibody in sample to any bacterial antigens
(D) Cross-reactivity of anti-Rickettsia antibody in sample to Proteus antigens

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92. A man with febrile and diarrheal illness came to a hospital and a physician examined the patient. CBC and widal tests were requested to be performed. The lab results showed that the patient had elevated leukocyte count and positive widal test result. The physician requested antibody titer of widal test for further investigation.

What is the reason for doing antibody titer in this case?
(A) Screening the presence of antibodies against the causative agent of typhoid
(B) Identifying the presence of antibodies that cross-react with any bacterial agents
(C) Screening the presence of antibodies that would bind to the latex-coated antigen
(D) Calculating the relative amount of antibodies against the causative agent of typhoid

93. A 27-year-old woman was raped by a gangster. After a month, she came to a laboratory to check her pregnancy status. Then, the laboratory technologist decided to use beta hCG in the blood sample rather than alpha hCG in the urine.

What is the reason for using beta hCG sample?
(A) Because the beta hCG subunit can induce cross reactivity
(B) Because the beta hCG subunit is unique to hCG in pregnancy
(C) Because the alpha hCG subunit is unique to hCG in pregnancy
(D) Because the alpha hCG subunit can be found in other hormones

94. A research practitioner was conducting H. pylori stool antigen test for a nationwide project. However, the practitioner was from public health profession and he was not familiar with the practical approaches of the test. Therefore, he consults a technologist on how to perform the test.

What should be the recommendation of the laboratory technologist?
(A) To bring all materials and specimens to room temperature before testing
(B) To bring all materials and specimens to room temperature following testing
(C) To mix the sample with specimen bottle with the buffer no temperature adjustment
(D) To remove the cassette directly from the sealed pouch without temperature adjustment

95. An immediate transfusion was mandatory for a young woman who developed anemia as a result of bleeding during delivery. The laboratory technologist was screening blood for any transfusion transmissible infections (TTIs), and after a couple of minutes he observed one red line in the T region but not in the C region of the test cassette for HIV.

What is the interpretation of this result?
(A) Invalid
(B) Reactive
(C) Non reactive
(D) Inconclusive

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96. Plasma apheresis was done for transfusing plasma for a patient having plasma deficiency. The laboratory personnel received 80 units of different plasma samples for infectious diseases screening. Thus, as the application of sandwich ELISA is appreciated in the blood bank, he decided to do sandwich ELISA as per its principle for better screening of infections.

What is the basic principle behind Sandwich ELISA?
(A) It detects specific antigen to a specific infectious disease
(B) It detects specific antibody to a specific infectious disease
(C) It is not worth enough to screen a specific infectious disease
(D) It detects antigen-antibody complex of infectious disease regardless of specificity

97. A fresh laboratory technologist was working on ELISA for quantitative measurement of HIV gp24. The standard was checked by a senior technologist for its functionality and it was working nicely. However, serial dilution of the standard showed the absorbance of the standard was decreased when standard concentration is increasing, suggesting a fallacy.

What was the most possible source of error in this enzyme immunoassay?
(A) Standard dilution was not done serially
(B) Standard dilution was done serially in the correct order
(C) Standard dilution was done serially but in the reversed order
(D) Standard's dilute to diluents ratio was mistaken but the order was correct

98. While running a flow cytometry, a laboratory technologist used two fluorochromes in single experiment for IL-12 and IFN-gamma cytokine assay released by Th1 cells. However, he obtained the fluorescence emission interference between the two fluorechromes.

What is the best measure of action to correct this error?
(A) Compensation (C) Sorting
(B) Stokes shift (D) Gating

99. A laboratory technologist was observing ova of *Ascarislumbricoides* under the microscope using 40x objective and 10x eyepieces.

What is the total magnification of the image of the parasite?
(A) 50x (B) 100x (C) 400x (D) 1600x

100. A laboratory technologist wanted to prepare an eosin stain for hematological staining and picked up the bottle with eosin powder from the store. He weighed 2.5g of the powder and thoroughly dissolved it in 500ml of distilled water.

What is the concentration of this solution?
(A) 0.005 g/ml (B) 0.05 g/ml (C) 0.5 g/ml (D) 5.0 g/ml

THE END

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